**United States Environmental Protection Agency** **Office of Research and Development**

**National Exposure Research Laboratory**
**Research Abstract**
Government Performance Results Act Goal: Clean, Safe Water

Significant Research Findings:

# Case Studies Illustrating the Stressor Identification Process

**Scientific Problem and Policy Issues**

To achieve the objective of restoring and maintaining the chemical, physical and biological integrity of the Nation's waters, numerous States and Tribes are using biological assessments and biocriteria to identify water bodies in which the fish, invertebrate, algae or plant communities, and other aquatic life have been detrimentally impacted by different single or multiple causes. In many cases, the cause(s) of these biological impairments has not yet been determined. The Stressor Identification Guidance Document provides a logical, scientific process by which State, Tribal, and other water quality experts can evaluate available information to identify the stressor(s) causing the biological impairments. Two illustrative cases studies were developed as part of the Stressor Identification Guidance Document.

The Guidance Document, which was published under the authority of Section 304(a)(2) of the Clean Water Act (CWA), is designed to assist water quality managers in identifying unknown causes of biological impairments in any type of water body.

**Research Approach**

Potential case studies were submitted by States and U.S. EPA Regional Offices to the Stressor Identification Workgroup, which is comprised of members from the States and the U.S. EPA's Office of Research and Development, Office of Water, and Regional Offices. A study of the Presumpscot River in Maine was selected to illustrate a relatively simple case restricted to a short stretch of river. A study of the Little Scioto River in Ohio was used to demonstrate the causal analysis process in a situation where multiple causes occurred along several miles of a river. Data for the cases were provided by the Maine Department of Environmental Protection and the Ohio Environmental Protection Agency.

In both cases, data were used to eliminate improbable causes and then other data from the site, other sites, or studies were evaluated in a

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| | strength of evidence analysis. All of the data, evidence, and analyses were presented according to the process described in chapters two through five of the Stressor Identification Guidance Document. Invertebrate communities in the Presumscot River were found to be impaired by total suspended solids. In the Little Scioto River, embedded substrates were identified as causing biological impairment in the most upstream location while polyaromatic hydrocarbons and ammonia and nutrient enrichment were identified as causes in the middle and most downstream locations. |
| **Results and Implications** | By illustrating the principles and processes of the Stressor Identification Guidance Document, these case studies should enable States and Tribes to more easily perform a causal analysis themselves. Once the causes of the biological impairments are identified, water resource managers will be better able to locate the sources of the stressor, or stressors, and take management actions aimed at improving the biological condition of the water body. This guidance is advisory in nature and its use is not mandatory. As such, this guidance does not impose legally-binding requirements on the U.S. EPA, the States, Tribes, industry, the public, or any other entity. |
| **Research Collaboration and Publications** | The U.S. EPA has published the Stressor Identification Guidance Document under document number EPA-822-B-00-025, dated December 2000. Paper copies can be obtained from the U.S. EPA Water Resource Center by phone at (202) 260-7786, by e-mail at center.water-resource@epa.gov, or through conventional mail by sending a letter of request to U.S. EPA Water Resource Center, Ariel Rios Building, 1200 Pennsylvania Ave., Washington, DC 20460. Copies of the document may also be obtained from the U.S. EPA National Center for Environmental Publications and Information (NCEPI) by phone at (513) 489-8190 or through conventional mail at 11029 Kenwood Road, Cincinnati, OH 45242. The document and fact sheet are also available on the U.S. EPA website at http://www.epa.gov/OST/biocriteria. |
| **Future Research** | Several avenues of research continue to build on the foundation established by the stressor identification process. Case studies are being performed to demonstrate how the process works with both simple and complex situations in a variety of ecosystems. Associations and other types of evidence are being developed that can be used in many causal analyses, for instance, the relationship between excessive nutrients and sensitive biological endpoints such as aquatic insects. This type of information can be used in many causal determinations. A Causal Analysis, Diagnosis and Decision Information System (CADDIS) is being planned that will allow routine |

application of the process and put needed data and tools at the fingertips of resource managers. This tool will help U.S. EPA Regional Offices, States and Tribes to make rapid, consistent, and legally defensible identification of causes of water quality impairments and will help to resolve Total Maximum Daily Load issues.

**Contacts for Additional Information**

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